

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF MASSACHUSETTS**

SINGULAR COMPUTING LLC,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

Civil Action No. 1:19-cv-12551 FDS

Hon. F. Dennis Saylor IV

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**DEFENDANT GOOGLE LLC'S POST-HEARING CLAIM CONSTRUCTION BRIEF**

## I. INTRODUCTION

In accordance with the Court’s March 31 order (ECF No. 156), Defendant Google LLC respectfully submits this supplemental brief to address issues discussed at the *Markman* hearing.

## II. ARGUMENT

### A. “Repeated execution”

Google has shown by clear and convincing evidence that “repeated execution” is indefinite, and Singular’s *Markman* presentation failed to show otherwise. Singular failed to identify any intrinsic evidence supporting its contention that “statistical mean, over repeated execution” should be interpreted as “*stable* statistical mean, over repeated execution.” Nor did Singular meaningfully address the fact that its construction incorporates subjective terms of degree that are themselves indefinite. Singular failed to substantiate its specious claim that Google has conceded “repeated execution” is definite in IPR proceedings. And Singular failed to identify any real dispute that prevents the Court from ruling on indefiniteness now.

#### 1. Singular’s attempt to salvage “repeated execution” by pointing to “statistical mean” is devoid of support.

As Google explained at the *Markman* hearing, Singular’s argument that “repeated execution” is not indefinite hinges on applying a specific meaning to a different claim term—“statistical mean.” Declaration of Christopher Sun in Support of Google’s Post-Hearing Claim Construction Brief (“Sun Decl.”), Ex. A (*Markman* Hr’g Tr.) at 36:5-11. According to Singular, “statistical mean” has a specialized meaning that should not be conflated with “average.” Singular argued that “the reason [Google’s] argument is technically erroneous is they ignore the term ‘statistical mean.’ That’s in the claim, it’s not ‘arithmetic average.’” *Id.* at 74:13–15 (internal marks altered). Singular argued that a statistical mean is distinct from an average because the former is *stable* value: “I really believe that one of ordinary skill in the art would not, even Dr. Wei would not assume over there on the far left red box where it’s bouncing around like that is a statistical mean of anything.” *Id.* at 83:9-12 (discussing chart at paragraph 34 of Dr. Khatri’s declaration (ECF No. 135-1)).

But Singular has supplied no *evidence* for its definition of “statistical mean”—not even in Dr. Khatri’s testimony. Dr. Khatri’s declaration refers to the concept of a “stable statistical mean,” which suggests that a statistical mean is not necessarily always stable. Khatri Decl. (ECF No. 135-1), ¶ 33. And when Dr. Khatri was asked at deposition to explain how a “statistical mean” described anything other than the sum of all results divided by the total number of results (*i.e.*, an arithmetic average), he refused<sup>1</sup>:

Q What, if any, distinction is there between a mean and a statistical mean?

THE WITNESS: So if you -- if you want to ask me this question, I would request you to show me the context. Because this would depend on context. And so if you give me context, I can give you a good answer.

....

Q As a matter of mechanics, how would the person of skill in the art calculate the statistical mean?

THE WITNESS: There are multiple ways to calculate the statistical mean.

Q Can you give one example?

A If you’re, you know, computing the mean of a number of -- you know, for example, a number of numerical values, you can compute them one of many ways. ***You can compute a rolling mean or you can compute the mean, you know, by adding all those values and dividing by the number of values.*** There are multiple mechanisms by which one could compute this.

Q So if I understand correctly, one of the ways in which to compute the mean would be to add all of the output values and then divide them by the -- divide the sum of that by the total number of outputs, correct?

THE WITNESS: That’s not what I said.

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<sup>1</sup> Google has omitted Singular’s counsel’s objections from these deposition excerpts.

Q Okay. I guess what did I get wrong about the math and what I just described?

THE WITNESS: I'll repeat my answer, right? So if you wanted to -- *one of the ways to compute the statistical mean of, let's say, N numerical values would be to add all those N numerical values up and take the resulting sum and divide it by N.*

....

Q One of the ways to calculate the statistical mean of N numerical values would be to sum the numerical values and divide the resulting sum by N, correct?

THE WITNESS: So that's not what I said. I said, you know, this is one of the ways -- your question was, if I recall correctly, you know, how does one compute an average. And I said there are multiple ways to do that. And now you're replacing that language, average, with statistical mean, which is misleading because statistical mean -- the statistical mean is a claim term at issue in this patent. And I'm not referring to statistical mean, you know, when I give you this definition of the average.

In terms of the definition of statistical mean, I have opined on it explicitly in my report. And that's the language I read out to you a little while ago which read, "Based on this" -- this is the bottom of paragraph 28, the last line: "Based on this elementary knowledge, a POSITA would know that the statistical mean for repeated execution of the numerical value represented by the first output signal would require them to conduct a large enough number of repetitions until the statistical mean reached a stable value."

So in the context of the patent, there is -- you know, the language of statistical mean is coupled with this repeated execution language. And this is conducted *until the statistical mean reaches a stable value.*

Khatri Depo. (ECF No. 146-2) at 53:7-16, 56:4-59:18 (emphases added); *see also id.* at 54:6-25.

Dr. Khatri's oblique answer confirms what his declaration implies: that a statistical mean does not necessarily have a stable value. In other words, Dr. Khatri does not contend that the term "statistical mean" requires a stable value. Rather, he contends that a skilled artisan would infer that "statistical mean" *as used in the asserted patents* refers to a "stable" statistical mean.

That assertion, however, is nothing more than Dr. Khatri's say-so. And the Federal Circuit has made clear that "conclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1318 (Fed. Cir. 2005). Dr. Khatri failed to cite any intrinsic evidence in support of his interpretation of "statistical mean" as a "**stable** statistical mean." *See generally* Khatri Decl. (ECF No. 135-1), ¶¶ 27-36 (citing no intrinsic evidence referring to stability). He instead opines that a skilled artisan would reach that interpretation by relying on the "Law of Large Numbers." *Id.*, ¶ 28. But Dr. Khatri did not identify anything in the claims, specification, or prosecution history that references the law of large numbers; indeed, he testified that "I've never said that the patent incorporates the law of large numbers." Khatri Depo. (ECF No. 146-2) at 98:10-22; *see also id.* at 97:6-98:8. Nor did Singular identify any intrinsic evidence supporting its view through argument. In fact, Singular purported to cite intrinsic evidence bearing on the definition of "statistical mean" just once, at the *Markman* hearing, where Singular claimed that

"[i]f you look at the patent and specifically column 14, lines 58 to I believe 60, 59 and 60, they're talking about an analog, typical analog signal itself modulates and then comes to stability over time period before it's even, before you even start going in and taking the statistical mean thereof.

Sun Decl., Ex. A (*Markman* Hr'g Tr.) at 70:21-71:1.<sup>2</sup> That portion of the specification says nothing of the sort. Instead, it describes an embodiment "where the mantissa is an analog value" that "may be accurate to about 1%." '273 patent (ECF No. 112-2) at 14:54-60. That description of how numerical values could be represented has nothing to do with how a statistical mean of multiple output values would be calculated.

In short, Singular has confirmed that "statistical mean" is not a specialized term of art, and thus it can only ask the Court to take Dr. Khatri's word that a skilled artisan would interpret "statistical mean" as "stable" in the context of the asserted patents. But the word of an expert

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<sup>2</sup> Google presumes that Singular's counsel was citing the '273 patent, which the parties have consistently cited in *Markman* briefing.

alone cannot render claim language definite. *See Phillips*, 415 F.3d at 1318; *see also In re Walter*, 698 F. App'x 1022, 1027 (Fed. Cir. 2017) (giving no weight to expert testimony on meaning of claim term because opinion was unsupported by evidence or analysis). Dr. Khatri's conclusory opinion, unsupported by intrinsic evidence, is not enough to overcome Google's showing of indefiniteness.

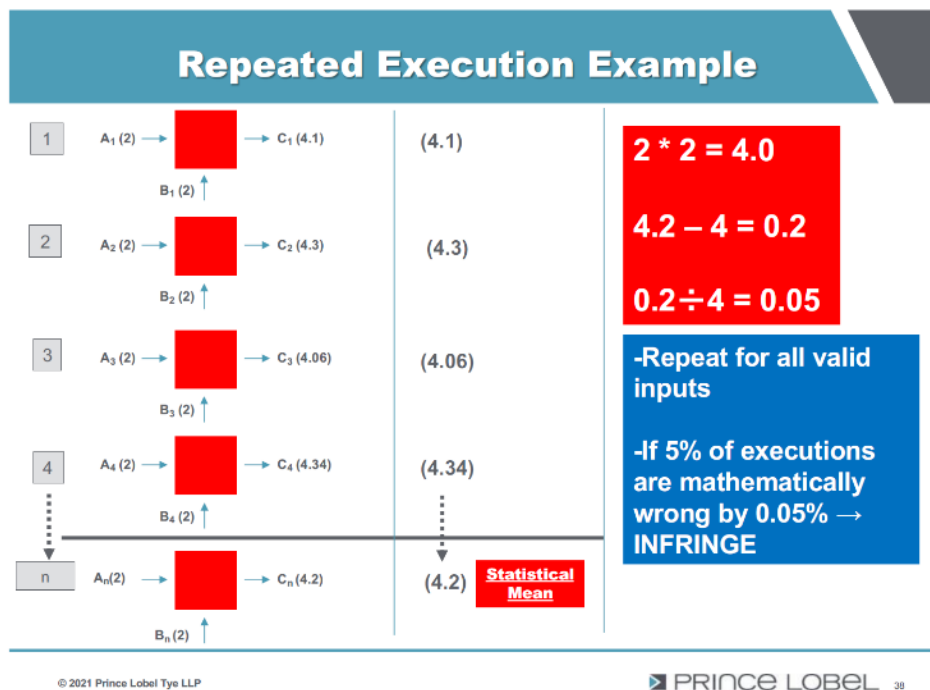
**2. Singular ignores the legal standard for indefiniteness and proposes a construction that creates indefiniteness problems of its own.**

Singular's *Markman* presentation also confirmed that its indefiniteness argument is premised on an incorrect legal standard. The mere fact that Dr. Khatri could come up with a definition for "statistical mean" is not enough to render "repeated execution" definite. To be definite, a patent's "claims, viewed in light of the specification and prosecution history, [must] inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). In other words, definiteness is about the clarity of a claim's *scope*, not whether the claim is "amenable to construction" or "insolubly ambiguous." *Id.* at 901 (citation omitted). Singular has repeatedly failed to grapple with that distinction, arguing that "[a] claim is not indefinite as long as its meaning is 'discernible'" and thereby invoking a standard the Federal Circuit has expressly held is no longer good law. Singular Preliminary Claim Construction Br. (ECF No. 112) at 5; *see also Dow Chem. Co. v. Nova Chems. Corp. (Canada)*, 803 F.3d 620, 630–31 (Fed. Cir. 2015) (holding that discernibility standard was incompatible with *Nautilus*).

Further, Singular's interpretation of "statistical mean, over repeated execution" fails to delineate the metes and bounds of the claim. In his declaration, Dr. Khatri stated that his concept of a "stable" statistical mean incorporated subjective terms of degree: "never *materially* changes again," does not "*meaningfully* fluctuate," or has ceased to "fluctuate[] *significantly*." Khatri Decl. (ECF No. 135-1), ¶¶ 29, 33, 34 (emphasis altered). At his deposition, Dr. Khatri testified repeatedly that a skilled artisan's understanding of these terms of degree would shift depending on context. Khatri Depo. (ECF No. 146-2) at 109:23-111:24, 112:8-14, 113:4-9, 142:6-24,

150:18-152:18. And at the *Markman* hearing, Singular was unable to offer any further guidance. When the Court asked “[a]re we talking about a billion or a trillion or are we talking two or three?”, Singular insisted that “[y]ou can’t have a specific number. Why? Because all of the systems are different, all of the perturbations are different, and analog signals are going to have a different analog signal.” Sun Decl., Ex. A (*Markman* Hr’g Tr.) at 72:14-20.

Singular’s demonstrative “example” of repeated execution of an operation underscores the problems with its proffered construction:



Sun Decl., Ex. B (Singular *Markman* Slides) at 38. Singular’s demonstrative purports to show that after some undefined “n” number of executions, a skilled artisan would decide the statistical mean of all results is sufficiently stable to determine infringement.

But in fact, the graphic reflects multiple numbers of “repeated executions”—after all, two, three, and four executions are all “repeated.” Nothing in the graphic explains how a skilled artisan would understand when “n” is reached—*i.e.*, why a skilled artisan would deem the statistical mean after “n” executions as sufficiently stable to determine infringement, as opposed to the statistical mean after “n – 1” executions. Indeed, if Singular and Dr. Khatri are to be

believed, determining whether “n” has been reached will require skilled artisans to make subjective, context-dependent judgments every time. And Singular’s graphic fails to even identify—much less analyze—the factors that might be relevant to the contextual judgments that Singular believes are necessary.

Even before *Nautilus*, the Federal Circuit recognized that a construction requiring subjective determinations about how long it would take to reach a particular state is indefinite. *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1250, 1254 (Fed. Cir. 2008), *abrogated on other grounds by Nautilus*, 572 U.S. at 912. Such a construction “would not notify the public of the patentee’s right to exclude since the meaning of the claim language would depend on the unpredictable vagaries of any one person’s opinion.” *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1350 (Fed. Cir. 2005), *abrogated on other grounds by Nautilus*, 572 U.S. at 912; *see also KLA-Tencor Corp. v. Xitronix Corp.*, No. A-08-CA-723-SS, 2011 WL 318123, at \*3–5 (W.D. Tex. Jan. 31, 2011) (finding term “substantially” indefinite where specification, prosecution history, and expert testimony failed to provide objective standard for term). Singular’s proposed construction is thus indefinite in its own right.

**3. Singular failed to substantiate its claims that Google has taken inconsistent positions or that a dispute of fact precludes deciding indefiniteness now.**

Given the seriousness of Singular’s accusation that Google’s IPR expert, Richard Goodin, “had no problem . . . finding that the asserted claims provide ‘reasonable certainty’ regarding the scope of the claims,” Singular Reply Claim Construction Br. (ECF No. 135) at 2, one would expect the point to have figured prominently in its *Markman* presentation. Yet Singular made nary a mention of its accusation at the hearing, because the accusation is specious. Mr. Goodin never opined that “repeated execution” is sufficiently definite because Google’s IPR petitions do not present that issue. The PTAB, of course, is not authorized to rule on indefiniteness in IPR proceedings. *Samsung Elecs. Am., Inc. v. Prisia Eng’g Corp.*, 948 F.3d 1342, 1350–51 (Fed. Cir. 2020). And Google did not ask the PTAB to construe “repeated



execution” because Google’s obviousness arguments before the PTAB do not require a construction of that term. Rather, the prior art Google identified to the PTAB discloses deterministic digital operations, and thus whether it meets the asserted patents’ limitations is unaffected by how many times an operation is executed. The Board need not reach claim construction issues that are not material to the prior-art obviousness dispute before it. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). In any event, nothing in Mr. Goodin’s opinion is in tension with Google’s position here. In discussing the term “repeated execution,” Mr. Goodin noted only that the asserted claims “expressly cover non-deterministic implementations”—*e.g.*, analog embodiments. *E.g.*, Declaration of Brian Seeve., Ex. 8 (ECF No. 136-7), ¶ 56 (emphasis omitted). He never suggested that the term was definite.

Equally wrong is Singular’s continued insistence that the Court cannot resolve indefiniteness on the present record. Singular and Dr. Khatri either openly concede or decline to squarely dispute the factual bases of Google’s indefiniteness argument. *See* Google Supplemental Claim Construction Br. (ECF No. 146) at 2–3 (identifying undisputed points with record citations). Singular’s *Markman* presentation failed to show otherwise.

Because Google has met its burden with clear and convincing evidence, the Court can and should now hold “repeated execution” is indefinite.

#### **B. “LPHDR execution unit”/“execution unit”**

Two points raised at the *Markman* hearing regarding the disputed term “LPHDR execution unit” warrant further discussion.

First is the question of whether Singular’s proposed construction, which limits the LPHDR execution unit to a hardware embodiment and further requires it to be “paired with memory,” is consistent with the specification’s references to software embodiments of the invention. As Google noted at the hearing, the answer to this question must be “no,” because the specification teaches that *every* claim of the patent can be implemented in software and the memory required by Singular’s construction is inconsistent with software.

As an initial matter, there is no dispute that, as Google made clear in its Reply Claim Construction Brief, “*software* tangibly stored on a computer-readable medium cannot include a *memory circuit*, because software is *computer code* while a memory circuit is *hardware*.” Google Reply Claim Construction Br. (ECF No. 134) at 8 (emphasis in original). The parties’ only disagreement on this issue is whether the memory limitation Singular hopes to read into “LPHDR execution unit” should be rejected because it would improperly exclude the patent’s software embodiment identified in the specification. *See, e.g., Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1276–77 (Fed. Cir. 2008). For its part, Singular argues that “not every embodiment described in the specification of the patents-in-suit must be covered by every claim of those patents,” and “[w]hen the patentee wished to claim a software embodiment he did so,” such as in Claims 33 and 68. Singular Reply Claim Construction Br. (ECF No. 135) at 11. Both of those claims describe a device storing “computer program instructions, wherein the computer program instructions are executable by the processor to emulate a second device comprising at least one” LPHDR execution unit. *Id.* at 11 (citing ’273 patent (ECF No. 112-2) at 31:33-53, 34:1-26). But Singular misunderstands the point. While claims 33 and 68 include a preamble directed to software, they are not the only claims that cover the software embodiment of the purported invention. Rather, as the specification makes clear, “any of the techniques” claimed in the ’273 patent may be implemented in software. ’273 patent (ECF No. 112-2) at 29:16-19.

At the *Markman* hearing, the Court asked the following hypothetical question:

[L]et’s say that claim 53 covers an abacus and it’s a physical thing, and then claim 68 says software that emulates an abacus. That doesn’t necessarily mean an abacus isn’t a physical thing, it means you are claiming an abacus and you are claiming software that emulates an abacus, right?

Sun Decl., Ex. A (*Markman* Hr’g Tr.) at 51:3-8. That question gets to the heart of the flaw in Singular’s argument. The key distinction between the Court’s hypothetical abacus and the LPHDR execution unit is that, unlike the abacus, the LPHDR execution unit is not limited to a physical device. Singular’s argument that an execution unit is “a thing”—and, indeed a thing that

is physical hardware—is unsupported by the intrinsic or extrinsic evidence. As to the intrinsic evidence, it directly contradicts Singular’s position: the specification of the ’273 patent makes clear that the LPHDR execution unit itself can be “implemented” in the form of hardware, software, firmware, or some combination thereof, so long as it meets the limitations set forth in the claims. ’273 patent (ECF No. 112-2) at 29:5-19 (“[A]ny of the techniques described above may be implemented, for example, in hardware, software tangibly stored on a computer-readable medium, firmware, or any combination thereof.”). And although Claims 33 and 68 describe a type of software embodiment with certain dynamic ranges and error rates, the LPHDR execution unit is not defined differently for these claims. These claims thus do nothing to support an argument that the specification’s teaching of a software embodiment is limited to these claims; rather, software is covered by every LPHDR execution unit claimed in the asserted patents based on the specification’s teaching. Singular cannot avoid the effect of this intrinsic evidence by arguing, as it appeared to at the *Markman* hearing, that the software embodiment would cover just the arithmetic unit while the entire execution unit would have to include hardware. *Cf.* Sun Decl., Ex. A (*Markman* Hr’g Tr.) at 6:25-7:8 (distinguishing Figure 4 and Figure 6 of the patents in suit). The specification states that software can embody the entire “invention” of the patents, not just the arithmetic unit. *See, e.g.*, ’273 patent (ECF No. 112-2) at 25:61-26:2 (“[E]mbodiments of the present invention may be implemented using any programmable conventional digital or analog computing architecture . . . which has been programmed with software to perform the LPHDR operations disclosed herein.”); *id.* at 29:16-19 (“More generally, any of the techniques described above may be implemented, for example, in hardware, software tangibly stored on a computer-readable medium, firmware, or any combination thereof.”). As to extrinsic evidence, it is notable that while Singular submitted an extensive expert declaration in its responsive brief, it did not provide any expert opinion that an execution unit is limited to hardware, either in the opinion of a person of skill in the art generally, or when read in the context of the specification of the patents in suit. Because Singular’s construction conflicts with the intrinsic record, it should be rejected.

The second issue is whether Singular’s proposed construction runs afoul of the doctrine of claim differentiation by attempting to read a limitation (*i.e.*, “memory”) into independent claims when that limitation already appears in dependent claims. Google Reply Claim Construction Br. (ECF No. 134) at 7. For instance, dependent claim 25 of the ’273 patent, which is not asserted, introduces the following limitation: “The device of claim 1 . . . wherein the device includes memory locally accessible to at least one of the LPHDR execution units . . . .”

At the *Markman* hearing, Singular attempted to push back on this point, arguing that “locally accessible” memory, as described in Claim 25, is more specific than the “memory” they refer to in their proposed construction. *See* Sun Decl., Ex. B (Singular *Markman* Slides) at 7; *see also* Sun Decl., Ex. A (*Markman* Hr’g Tr.) at 9:2-3 (“A local [*sic*] accessible memory is not a memory.”). In other words, Singular now contends that “*EVERY* embodiment” of the purported invention contains an “arithmetic circuit paired with a memory circuit,” Sun Decl., Ex. B (Singular *Markman* Slides) at 8 (emphasis in original), while the limitation of “locally accessible” memory is a more specific subtype of memory circuit. Singular Reply Claim Construction Br. (ECF No. 135) at 11. Singular explicitly staked out that position at the *Markman* hearing, arguing that “[a] local accessible memory is not a memory. Obviously, memory is broader, and thus the notion that the scope of 53 and 25 are the same is just simply the argument factually is incorrect.” Sun Decl., Ex. A (*Markman* Hr’g Tr.) at 9:2-5. In fact, Singular’s only evidence for the premise that “*EVERY* embodiment has memory paired” is Figure 4, which by its own terms is only “an example design” for a hardware embodiment of a processing element, ’273 patent (ECF No. 112-2) at 10:34-36, and itself discloses a PE with “local” memory, *id.* at 10:36 (“The PE 400 stores local data.”). While Singular has no basis for limiting the claims’ scope to Figure 4, its response to Google’s claim differentiation highlights the core flaw in Singular’s logic: Singular cites Figure 4 to avoid the plain meaning (as confirmed by intrinsic evidence) of “execution unit”—which can include a software embodiment—but then when faced with the claim differentiation argument, says its construction is broader than the embodiment it relies on to limit the claim in the first place. Put another way,

Singular’s position goes one step beyond the already disfavored approach of limiting a claim to a particular embodiment: it tries to limit the claim to an *undisclosed* embodiment that is narrow enough to exclude the disclosed software embodiment but broader than the Figure 4 embodiment. Singular’s attempt to gerrymander the claim in this way has no support in the specification, which simply discloses execution units with which memory *may* be paired, but that do not *require* such a pairing. Google Reply Claim Construction Br. (ECF No. 134) at 7. Singular’s latest argument does not solve this fundamental flaw; its proposed construction should not be adopted.

**C. “First input signal representing a first numerical value”**

Google’s proposed construction of “first input signal representing a first numerical value” clarifies that the claimed LPHDR execution unit performs operations on the specific values represented by input signals, not on the signals themselves. At the *Markman* hearing, Singular continued to assert that the term requires no construction and that the Court should instead adopt its plain meaning. *See* Sun Decl., Ex. A (*Markman* Hr’g Tr.) at 70:4-8. But that assertion is belied by the very fact of the parties’ present dispute.

The parties have a fundamental disagreement about the meaning of the claim language and, thus, the scope of the asserted claims. Google contends that the asserted patents claim a LPHDR execution unit that operates on numerical values represented by signals. Singular, in contrast, believes that the asserted patents claim a LPHDR execution unit that instead operates on signals. This is precisely the kind of dispute that claim construction proceedings are intended to resolve. “Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement.” *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997). And “[w]hen the parties present a fundamental dispute regarding the scope of a claim term, it is the court’s duty to resolve it.” *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co., Ltd.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008). In such circumstances, “the ‘ordinary’ meaning

of a term does not resolve the parties' dispute, and claim construction requires the court to determine what claim scope is appropriate in the context of the patents-in-suit." *Id.* at 1361.

Indeed, it is hard to understand how the plain and ordinary meaning of "first input signal representing a first numerical value" could possibly suffice as a construction given that Singular cannot even decide for itself what the term means and whether the claimed LPHDR execution unit operates on signals or values. As noted before, Singular has taken diametrically opposed positions on that very issue in its briefing before this Court and the PTAB<sup>3</sup>:

Court	PTAB
"The claimed 'execution unit' operates on 'signals' that represent numerical values, and do not perform operations directly on values." <sup>4</sup>	"[T]he invention . . . operates on the values represented, not their physical representation." <sup>5</sup>

Adopting Singular's proposed plain-meaning approach presents the very real risk of having the term used inconsistently during the course of the case: arguing on the one hand—as Singular seems to be attempting to do now—that the LPHDR execution unit somehow operates on signals but then arguing when trying to avoid invalidation—whether by way of indefiniteness<sup>6</sup> or anticipation/obviousness by prior art—that the LPHDR's unit must operate on numerical values. This is not a speculative risk: Singular's own position that it took before the

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<sup>3</sup> Singular's contention that the LPHDR execution unit operates on signals also contravenes the allegations in its own complaint, *see, e.g.*, Am. Compl. (ECF No. 37), ¶¶ 35, 46a, 85, 90c, and infringement contentions, *see* Sun Decl., Ex. C (Singular Infringement Contentions) at 7. Furthermore, it flouts the clear language of the specification—a fact Singular has never meaningfully contested. *See, e.g.*, '273 patent (ECF No. 112-2) at 2:9-18 ("Embodiments of the present invention are directed to a processor or other device . . . which includes processing elements designed to **perform arithmetic operations . . . on numerical values . . .**" (emphasis added)).

<sup>4</sup> Singular Responsive Supplemental Claim Construction Br. (ECF No. 149) at 4.

<sup>5</sup> Patent Owner Preliminary Response, Case No. IPR2021-00178 (ECF No. 146-4) at 52.

<sup>6</sup> As Google explained in its briefing, any position other than the one Google proposed in claim construction would lead to an indefiniteness problem with all the asserted claims. *See* Google Preliminary Claim Construction Br. (ECF No. 111) at 18-20; Google Reply Claim Construction Br. (ECF No. 134) at 11-12.

PTAB in response to the prior art presented there by Google, which is quoted in the right-hand box immediately above this paragraph, confirms Singular’s willingness to take inconsistent positions. Of course, that outcome is precisely what claim construction was designed to avoid. *See O2 Micro Int’l Ltd.*, 521 F.3d at 1362.

Notably, Singular’s efforts to keep its strategic options open come at a cost. By refusing to clarify what the claim language means, Singular has made it impossible to identify the boundaries of the asserted claims. For example, in its Responsive Supplemental Claim Construction Brief, Singular described how its interpretation of the claim language distinguishes between “the claimed ‘operation’, which is performed on signals . . . [and] the corresponding arithmetic that is performed on values.” Singular Responsive Supplemental Claim Construction Br. (ECF No. 149) at 4. But this distinction appears nowhere in the claim language. And it raises a host of questions about the scope of the asserted claims, most notably regarding what constitutes an “operation” and how it differs from “arithmetic . . . performed on values,” *id.*, since Singular has represented that the claimed LPHDR execution unit doesn’t perform arithmetic operations, *see* Sun Decl., Ex. A (*Markman* Hr’g Tr.) at 13:11-13 (“[W]hen they say, ‘final result, designed to perform arithmetic operations on numerical values,’ et cetera, ***that’s not what the processing element does.***” (emphasis added)).<sup>7</sup>

Among other things, these questions arise because Singular’s artificial distinction is not consistent with the claim language, which explains that the results of the “operations” performed by LPHDR units are to be compared to “the result of an exact ***mathematical calculation*** of the first operation on the numerical values of that same input.” ’273 patent (ECF No. 112-2), claim 53 (emphasis added). The only way this claim makes sense is if it’s instructing a person of skill in the art to perform an apples-to-apples comparison—comparing the results of one mathematical

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<sup>7</sup> Singular’s assertion that the claimed LPHDR execution unit does not perform arithmetic operations is particularly confusing given that it has proposed construing “execution unit” to incorporate an “arithmetic circuit.” Singular Preliminary Claim Construction Br. (ECF No. 112) at 9.

calculation to another. Were that not the case, a person of skill in the art would have no means of knowing how to compare the two results. Indeed, Singular itself cannot and does not explain what “operations” the LPHDR units perform if not arithmetic calculations. And without an explanation of what an “operation” is, a skilled artisan would have no way of comparing the results of such an “operation” to “the result of an exact mathematical calculation,” as the claim language requires. *Id.* Claim construction is intended to clarify the scope of the asserted claims. *O2 Micro Int’l Ltd.*, 521 F.3d at 1362. Because Singular’s construction does the opposite, the Court should reject it.

Notably, Singular raised few criticisms of Google’s proposed construction at the *Markman* hearing, and what few criticisms it offered were ineffectual. For example, Singular characterized Google’s proposed construction as reading out the term “input signal” and being inconsistent with Figure 4 of the specification. *See* Sun Decl., Ex. A (*Markman* Hr’g Tr.) at 67:23-68:7. But those characterizations are simply incorrect. In fact, the specification makes clear that even in the Figure 4 embodiment, the processing element receives inputs of values to operate on and those values are represented by signals, exactly as Google proposes. *See* ’273 patent (ECF No. 112-2) at 10:64-67. Google’s proposed construction of “first input signal representing a first numerical value” is thus consistent with, and supported by, the specification. For that reason, and those discussed in Google’s previous briefing, the Court should adopt it.

### III. CONCLUSION

For the foregoing reasons, as well as those set forth in Google’s other claim construction briefs, the Court should find the term “repeated execution” indefinite and adopt Google’s proposed constructions of “LPHDR execution unit” and “first input signal representing a first numerical value.”



Respectfully submitted,

Dated: April 7, 2021

By: /s/ Matthias Kamber

Gregory F. Corbett (BBO #646394)  
gregory.corbett@wolfgreenfield.com  
Nathan R. Speed (BBO # 670249)  
nathan.speed@wolfgreenfield.com  
Elizabeth A. DiMarco (BBO #681921)  
elizabeth.dimarco@wolfgreenfield.com  
WOLF, GREENFIELD & SACKS, P.C.  
600 Atlantic Avenue  
Boston, MA 02210  
Telephone: (617) 646-8000  
Fax: (617) 646-8646

Asim Bhansali (*pro hac vice*)  
abhansali@kblfirm.com  
KWUN BHANSALI LAZARUS LLP  
555 Montgomery Street, Suite 750  
San Francisco, CA 94111

Matthias Kamber (*pro hac vice*)  
mkamber@keker.com  
KEKER, VAN NEST & PETERS LLP  
633 Battery Street  
San Francisco, CA 94111-1809

*Attorneys for Defendant Google LLC*

**CERTIFICATE OF SERVICE**

I certify that this document is being filed through the Court's electronic filing system, which serves counsel for other parties who are registered participants as identified on the Notice of Electronic Filing (NEF). Any counsel for other parties who are not registered participants are being served by first class mail on the date of electronic filing.

/s/ Nathan R. Speed  
Nathan R. Speed